

## THE DANISH CONTROL PROGRAMME FOR SALMONELLA IN SLAUGHTER PIG HERDS

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Outbreaks of Salmonellosis in Danish pig herds were for many years very rare. However, at the beginning of this decade Salmonellosis in pigs became an emerging problem. The number of human cases were also increasing and in 1993 an epidemic (*S. infantis*) occurred in the Copenhagen area. The epidemic could be attributed to contaminated pork. Consequently, a preliminary Salmonella control programme was initiated in 1993 and the present control programme was established in January 1995, according to the Danish Act of Zoonoses, 1994 and Order of Salmonella Surveillance, 1994.

The main purpose of the programme is to reduce the prevalence of Salmonella in slaughter pig herds and pork. All Danish herds producing more than 100 slaughter pigs annually are tested serologically for Salmonella antibodies by random testing of pigs at slaughter. In total around 800.000 meat juice samples are tested annually from approximately 16.000 herds. The programme is organized by the Ministry of Food, Agriculture and Fisheries in cooperation with the Federation of Danish Pig Producers and Slaughterhouses (FDPPS).

The programme for slaughter pig herds is part of an integrated programme (Bager et al., 1995) to control Salmonella. Breeding and multiplying herds as well as animal feed and pork are monitored for Salmonella. At the slaughterhouses general measures to improve the hygiene at slaughter have been enforced and slaughtering of pigs from herds with a high prevalence of Salmonella is done under increased hygiene precautions.

### MATERIAL AND METHODS

*Programme management:* The Ministry of Food, Agriculture and Fisheries has established a central database, the Central Husbandry Register, covering all Danish herds and identifying these with a unique number. Part of this database include all slaughter pig herds in the Zoonosis Register, which is used to manage the Salmonella monitoring programme. The Zoonosis Register is administered by the Veterinary Service. The monthly delivery of slaughter pigs from each herd is recorded in the database. According to the number of pigs delivered during the preceding 13 weeks a sampling plan for each herd is calculated and distributed to the slaughterhouses, where the meat samples are collected randomly. The samples are frozen and under way to the Danish Veterinary Laboratory they thaw and thereby develop meat juice for analysis.

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The slaughterline computer is pointing out every carcass to be sampled in accordance to the

sampling plan. When a carcass is selected, a label identifying the sample is printed automatically. When the sample has been analysed, the result is transferred electronically to the database and the sample identification is combined to the herd number, thereby ensuring correct connection between test result and herd. For smaller slaughterhouses, without link to the database, the central computer prints and distributes the labels and selection of carcasses for sampling is done manually.

At the Danish Veterinary Laboratory the samples are tested for *Salmonella* antibodies by the so-called mix-ELISA, which detects antibodies to more than 95% of the *Salmonella* serotypes occurring in Danish pigs using a combination of the LPS-antigens O:1,4,5,6,7 and 12 (Nielsen, B et al., 1996).

*Herd monitoring:* Once a month each herd is assigned to one of three levels, depending on annual delivery and prevalence of seroreactors, calculated as an average of the latest three months. Every change in level must be approved by the Veterinary Service. Slaughterhouses and herd owners are informed monthly of the results of sample analyses and actual herd level.

Level 1 herds have no or only a few seroreactors. Level 2 herds have a moderate number of reactors, whereas level 3 herds have a high proportion of seroreactors and are considered a risk for contamination of carcasses and the slaughterhouse in general. Herds with clinical *Salmonellosis* are put under public restrictions by the District Veterinary Officer and assigned to level 3.

Owners of herds assigned to level 2 or 3 are obliged by the FDPPS to seek advice on how to reduce the prevalence of *Salmonella*. A herd intervention plan must be prepared in cooperation with a veterinary practitioner and a pig consultant. Part of the intervention plan is collection and analysing of mandatory pen-faecal samples, according to the Veterinary Services Order of September 1996. The results of the pen-faecal samples are used to determine the distribution of *Salmonella* within the herd.

If the intervention plan is not prepared within 35 days after the assignment to level 2 or 3, if the plan agreed upon has not been implemented after 3 months or if the herd stays in level 3 for more than 6 months a penalty per slaughtered pig will be collected by the FDPPS.

Pigs from level 3 herds are slaughtered under increased hygienic precautions, i.e. the pigs must be delivered late in the day and will be slaughtered as the last pigs on that day. The slaughterline speed is reduced or manpower is increased. Heads of carcasses are not split during slaughter. Plucks and offal are either rejected or heat treated. A total of 1400 cm<sup>2</sup> of the carcass is swabbed in order to monitor contamination with *Salmonella* during evisceration. The carcasses will be heat treated or brine cured if more than 25% of the samples from this group of pigs are positive (Emborg et al., 1997).

To monitor the prevalence of *Salmonella* in pork, thereby ensuring the continued effect of the herd control programme, approximately 2.300 samples, 1.500 from fresh pork and 800 from offal, are collected randomly every month at slaughterhouses.

## RESULTS AND DISCUSSION

During the surveillance period, the percentage of herds in level 1 has ranged between 93.7 and 95.7%. The level 2 and 3 proportion has ranged from 2.9 to 4.4% and 1.2 to 2.3%, respectively. From August 1996 to March 1997 a significant decrease in the proportion of level 3 herds has been recorded, whereas the proportion of level 2 herds has not changed significantly. The prevalence of *Salmonella* in pork products has remained low around 1% with some temporary variation (Emborg et al., 1997).

The programme has the advantage, that several factors can be changed with the same database management, i.e. selection of herds for intervention and criteria of the programme according to the stage of control and to future knowledge of control possibilities. Furthermore, the database can also be used for future control of other zoonoses or diseases.

## REFERENCES

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